

Translation

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PATENT COOPERATION TREATY



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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference FIN 249 PCT	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/DE2003/003208	International filing date (day/month/year) 26 September 2003 (26.09.2003)	Priority date (day/month/year) 27 September 2002 (27.09.2002)
International Patent Classification (IPC) or national classification and IPC G06F 17/50		
Applicant INFINEON TECHNOLOGIES AG		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of _____ sheets, including this cover sheet. <input type="checkbox"/> This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT). These annexes consist of a total of _____ sheets.
3. This report contains indications relating to the following items: I <input checked="" type="checkbox"/> Basis of the report II <input type="checkbox"/> Priority III <input checked="" type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability IV <input type="checkbox"/> Lack of unity of invention V <input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement VI <input type="checkbox"/> Certain documents cited VII <input type="checkbox"/> Certain defects in the international application VIII <input type="checkbox"/> Certain observations on the international application

Date of submission of the demand 26 April 2004 (26.04.2004)	Date of completion of this report 23 November 2004 (23.11.2004)
Name and mailing address of the IPEA/EP	Authorized officer
Facsimile No.	Telephone No.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/DE2003/003208

I. Basis of the report

1. With regard to the elements of the international application:*

- ☐ the international application as originally filed
- ☒ the description:
pages _____ 1-39 _____, as originally filed
pages _____, filed with the demand
pages _____, filed with the letter of _____
- ☒ the claims:
pages _____ 1-13 _____, as originally filed
pages _____, as amended (together with any statement under Article 19
pages _____, filed with the demand
pages _____, filed with the letter of _____
- ☒ the drawings:
pages _____ 1/10-10/10 _____, as originally filed
pages _____, filed with the demand
pages _____, filed with the letter of _____
- ☐ the sequence listing part of the description:
pages _____, as originally filed
pages _____, filed with the demand
pages _____, filed with the letter of _____

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language _____ which is:

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/fig _____

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rule 70.16 and 70.17).

** Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/DE2003/003208

III. Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

1. The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non obvious), or to be industrially applicable have not been examined in respect of:

☐ the entire international application.

☒ claims Nos. 4-6, 13

because:

☐ the said international application, or the said claims Nos. _____
relate to the following subject matter which does not require an international preliminary examination (*specify*):

☒ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. 4-6, 13
are so unclear that no meaningful opinion could be formed (*specify*):

☐ the claims, or said claims Nos. _____ are so inadequately supported
by the description that no meaningful opinion could be formed.

☐ no international search report has been established for said claims Nos. _____

2. A meaningful international preliminary examination cannot be carried out due to the failure of the nucleotide and/or amino acid sequence listing to comply with the standard provided for in Annex C of the Administrative Instructions:

☐ the written form has not been furnished or does not comply with the standard.

☐ the computer readable form has not been furnished or does not comply with the standard.

Supplemental Box

(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: III.

The application does not meet the requirements of PCT Article 6 because claims 4-6 and 13 are not clear.

- Claims 4-6 attempt to define a product by the method used to produce it, but it is unclear in what technical features the product so produced differs from one produced by a conventional method and what technical effect these features have.
- Claim 13 describes a method of downloading a program corresponding to claims 7-9. It is unclear in what technical features the method differs from conventional download methods and what technical effect is produced thereby.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/DE 03/03208

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-3, 7-12	YES
	Claims		NO
Inventive step (IS)	Claims		YES
	Claims	1-3, 7-12	NO
Industrial applicability (IA)	Claims	1-3, 7-12	YES
	Claims		NO

2. Citations and explanations

This report refers to the following documents:

- D1: US-B-6 405 357 B1 (CHAO TE TSUNG ET AL.) 11 June 2002 (2002-06-11)
- D2: US-B-6 357 036 B1 (MARTINEZ III MARCELLO R ET AL.) 12 March 2002 (2002-03-12)
- D3: US-A-5 331 572 (TAKAHASHI NAOYA) 19 July 1994 (1994-07-19)
- D4: US-A-5 498 767 (CASTRO JAMES J ET AL.) 12 March 1996 (1996-03-12)
- D5: US-A-5 608 638 (TAIN ALEXANDER C ET AL.) 4 March 1997 (1997-03-04).

The following document was not cited in the international search report. A copy was appended to the written opinion of 29.09.2004.

- D6: US-A-5 828 116 (Ao) 27 October 1998 (1998-10-27).

Novelty, Inventive Step

1. The solution proposed in claim 1 of the present application is not inventive (PCT Article 33(3)) for the following reasons:

Document D1, which is considered the closest prior art, discloses (following as much as possible the formulations used in claim 1 of the present application, the references in parentheses relating to document D1)

- a method of determining the arrangement of bonding pads on the active top side of a semiconductor chip disposed in or on a package (abstract: positioning bond pads), the method being carried out on a computer system and having the following steps:
- a) inputting into the computer system semiconductor chip data that have geometric properties of the semiconductor chip as well as information about the number of bond pads to be arranged at each edge of the semiconductor chip (implicit - it is obvious that for the following steps, especially for step f), the requisite data of files, terminals and the like must be input and converted into an electronic image of the component),
- b) inputting into the computer system bond pad data that have geometric and electric properties of the bond pads to be arranged on the active top side of the semiconductor chip (implicit),
- c) inputting into the computer system package data that have the geometric and electrical properties of the package as well as of the bond terminal faces to be arranged on the top side of the package (implicit),

- d) inputting into the computer system production data that stipulate the arrangement of the semiconductor chip in relation to the package (implicit),
- e) generating from the data input in steps a) to d) an image of an electronic component that comprises the package and the semiconductor chip arranged with its passive rear side on the top side of the package (implicit),
- f) arranging the bond pads in the image of the electronic component in edge regions on the active top side of the semiconductor chip so as
- (f1) to provide equal spacing between adjacent bond pads or between the outermost bond pads per semiconductor chip edge and the neighboring semiconductor chip edges (column 1, lines 20-26 "constant pad pitch", column 4, lines 15-22 "Corner Gap").

The subject matter of claim 1 differs therefrom in

- (f2) further alternatives to (f1) in step f) and
- g) providing bond pad arrangement data that have information about the arrangement, as per step f), of the bond pads on the active top side of the semiconductor chip, for subsequent processes of producing and/or designing the semiconductor chip and/or the package and/or the electronic component.

Steps (f1) and (f2) are alternative embodiments linked with "or". That means that an argument that denies an inventive step with one of the two embodiments of claim 1 is sufficient to deny it for the entire claim 1. The following examination is

therefore done separately for variants (f1) and (f2), starting with (f1).

The problem to be solved with the present invention can be seen as that of integrating the step of arranging the bond pads in subsequent steps.

A person skilled in the art is aware that in virtually all fields today a thorough integration of design and production is sought. It is, then, obvious that to realize the integration the bond pad arrangement data generated in step f) must be passed on for further processes of production and/or design of the chip, the package and the component (see, for example, D2, abstract: "extracts bond pad location data", "generates a bonding diagram for the semiconductor assembly"; D5, column 4, line 66 to column 5, line 34: "build sheet used during manufacturing", "connecting automatically the wires between the die pads and bond fingers to form a bonding device diagram").

Thus, a person skilled in the art, proceeding from D1 and charged with the task of thoroughly integrating design and manufacture, would arrive at the method described in claim 1 without an inventive step.

N.b. (variant 2):

Claim 1 is not inventive even if the alternative described in variant (f1) is replaced by one of variant (f2).

The alternatives sketched in (f2) are straightforward applications of known arrangement

methods for bond pads that can be combined as required (e.g. depending on the bonding methods and machinery used) and result in no surprising effects.

For ultrasonic bonding a person skilled in the art would select, for example, the radial arrangement shown in D6 (fig. 1; column 3, lines 61-63 "The wires 35 through 44 are all extended radially from the center of the sensor chip"), but for minimal bond lengths, the shortest distance between bond pads and bond terminals, shown as prior art in D6 (fig. 17), while in practice often compromising between the alternatives. Thus the expert - depending on the situation - would arrive at the solutions described in (f1) and (f2) without an inventive step.

2. Claims 2 and 3 are not inventive (PCT Article 33(3)) because they are straightforward applications of integrated design and production. See in particular D2 (abstract: "determine whether all bonds are within established guidelines", "generates a bonding diagram", "the bonding utility may interfere with a semiconductor design circuit to generate a suggested fix to a impermissible bonding situation. One or more bonding pads may be moved", fig. 2) and D3 (abstract: "a layout near bonding pads may be moved", "macro blocks are arranged", "the input/output blocks and the pads are connected to each other through wiring lines", fig. 3, column 2, lines 13-44).

To a person skilled in the art it is obvious that the generated design and layout data are used for further steps such as bonding and photomasking.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/DE '03/03208

3. Claims 7-12 are not inventive for the same reasons as for claims 1-3.